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The persistence of entrepreneurship and innovative immigrants

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ABSTRACT

Ethnicity and immigration status may play a role in entrepreneurship and innovation, yet the impact of university entrepreneurship education on this relationship is under-explored. This paper examines the persistence and differences in entrepreneurship by ethnicity and nationality. We find that among Stanford alumni, Asian Americans have a higher rate of entrepreneurship than white Americans. However, non-American Asians have a substantially lower, about 12% points lower, start-up rate than Asian Americans. Such discrepancy not only holds for entrepreneurial choice but also for investing as an angel investor or venture capitalist, or utilizing Stanford networks to find funding sources or partners. Participation in Stanford University's entrepreneurship program as a student does little to reduce this gap. The low level of parental entrepreneurship and the high degree of intergenerational correlation in entrepreneurship likely result in the lower level of entrepreneurship and participation in university entrepreneurship programs among Asians relative to their Asian American counterparts. Our findings highlight the value of immigration in terms of breaking the persistence in entrepreneurship among certain ethnic groups and promoting potential high-growth entrepreneurship in the United States. In addition, our findings may have important implications for programs to incorporate immigrant entrepreneurs within their home countries to promote entrepreneurship and help break the persistence of entrepreneurship across generations.

1. Introduction

The important role of universities as well as immigrants in driving innovation and entrepreneurship is increasingly recognized (Saxenian, 2006; Åstebro et al., 2012). For example, Hsu et al. (2007) find that among MIT alumni, non-US citizens become entrepreneurs at significantly higher rates than US citizens.¹ Despite the importance of both universities and immigrants, these two literatures have largely evolved independently, leaving us with relatively little to say about the possible impact of university or public policies on high-skilled immigrant entrepreneurs. One of the most notable features of entrepreneurship and innovation in Silicon Valley is the role Asian immigrant entrepreneurs have played (Saxenian, 1999, 2006). Despite the importance of Silicon Valley entrepreneurship and innovation, there is surprisingly little empirical analysis of entrepreneurial activity that originates from Silicon Valley. This paper examines the persistence and differences in entrepreneurship rates of Stanford alumni by ethnicity and nationality. Rather than examining issues of causality, our goal is to present an exploratory analysis of the patterns of Stanford alumni becoming

entrepreneurs by family background, ethnicity and nationality. Analysis of a population from a research university with a well-established reputation for innovation and entrepreneurship is important in establishing basic facts regarding university-trained, high skill immigrants. We know from anecdotal and systematic evidence that top research universities generate many leading firms. Many of these companies were started by either immigrants or first-generation U.S. citizens (Hart and Acs, 2011).² Research on academic entrepreneurship focuses largely on faculty entrepreneurs, technology transfer, and university spin-offs (Dahlstrand, 1997; Di Gregorio and Shane, 2003; Etzkowitz, 1998, 2003; Nicolaou and Birley, 2003; Vohora et al., 2004). Yet, we now know that the influence of the university on entrepreneurial behavior includes students and alumni as well (Åstebro et al., 2012; Bramwell and Wolfe, 2008; Hsu et al., 2007). However, the impact of the university environment on entrepreneurship among alumni merits deeper exploration, especially when it comes to immigrants and students from non-Caucasian, non-domestic backgrounds.

The question of who becomes an entrepreneur is not a new one to the literature. Yet, we offer three empirical advances. First, our data

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¹ We use the term "alumni" throughout to include both male alumni and female alumnae.

² Prominent examples include Sun Microsystems (Andreas Bechtolsheim and Vinod Khosla), Google (Sergey Brin), LinkedIn (Konstantin Guericke and Jean-Luc Vaillant), Hotmail (Sabeer Bhatia), Nvidia (Jen-Hsun Huang), Morris Chang (TSMC) and Yahoo! (Jerry Yang).

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comprise a representative sample of Stanford alumni who were not selected based on successful entry into entrepreneurship. Second, detailed data on alumni allows us to distinguish not only those from entrepreneurial families, but also to separately examine immigrants and first-generation Americans of similar ethnicity. Finally, a focus on alumni from a top research university permits the examination of the entrepreneurial career choices of a set of individuals with a degree of relative uniformity in educational level, exposure to an entrepreneurial environment in the university years and even social networks. This permits more of an apples-to-apples comparison.

The second research question we address is how the rate of entrepreneurship changes with participation in university entrepreneurship programs. This question has been relatively less explored in the literature, especially in connection with immigration status, ethnicity and career decisions. Relatively little work has examined the impact of educational initiatives to spur innovation and entrepreneurship among alumni (for an exception, see Eesley et al., 2016). One of the main contributions of this paper is in its coverage of a representative sample of all Stanford University graduates since the 1930s, regardless of whether one became an entrepreneur or not. The detailed demographic data in the survey allows us to explore both across and within ethnicity and nationality differences in entrepreneurship.

We find that among Stanford alumni, Asians on average are less likely to become an entrepreneur, invest as an angel investor or venture capitalist (VC), or become an entrepreneur turned investor. However, once we separate Asian Americans from non-American Asians the results diverge. Asian Americans have a higher rate of entrepreneurship than white Americans. However, Asians of foreign nationality have a substantially lower (by about 12% points), start-up rate than Asian Americans.³ The stark difference between Asian Americans and non-American Asians in entrepreneurship among Stanford University alumni suggests that despite the persistent cultural traits shared within each Asian subgroup, the difference in institutional and educational upbringing in the US generates large differences in start-up activity. We then examine whether these differences within the Asian sub-groups decrease as foreign Asian students obtain US university education and take advantage of the university's entrepreneurship programs. We focus on two major entrepreneurship programs initiated by Stanford University, the Center for Entrepreneurial Studies (CES) at the Business School and the Stanford Technology Ventures Program (STVP) at the Engineering School. We find that both programs positively and significantly predict start-up activity. However, controlling for program participation in both programs does not reduce the within Asian ethnic subgroup differences in entrepreneurship.

Why might non-American Asians be less entrepreneurial and why do they utilize entrepreneurship training to a lesser degree than their Asian American counterparts despite coming from similar cultural backgrounds? We find that parental entrepreneurship is lower among Asian Americans and even more so for non-American East Asians. Given that parental entrepreneurship status is one of the strongest and most persistent predictor of entrepreneurship, the low parental entrepreneurship rate among East Asians presents a persistent hurdle to promoting entrepreneurship in their respective countries. Further compounding the low levels of parental entrepreneurship is the high degree of intergenerational correlation in entrepreneurship, i.e., the relationship between one's entrepreneurship outcome and his or her parents' entrepreneurship experience. These two features likely reflect the relatively lower level of entrepreneurship and participation in university entrepreneurship programs among Asian non-Americans relative to their Asian American counterparts.

³ When we further separate the Asian category into three subgroups, i.e., Chinese, Indian, and other Asian, we find that the higher rate of start-up among Asian Americans is driven by the Chinese and Indian Americans. This is consistent with Saxenian's research on the high degree of entrepreneurship by Chinese and Indian immigrants.

The findings of this paper have important implication both in terms of the literature as well as policy. The literature has widely documented the difference in the rate and patterns of entrepreneurship by ethnicity or immigrant status in the US (Fairlie and Robb, 2007). For example, Fairlie (1999) finds that family background explains the significantly lower rates of black entrepreneurship in the US. Fairlie and Robb (2007) further find that the lower performance of black entrepreneurship is due to the lack of training in family businesses. Immigrants, especially Asian immigrants are often hailed as more entrepreneurial and studies on Silicon Valley entrepreneurship highlights the role immigrants have played in founding high-growth technology ventures (Saxenian 1999, 2006). Our finding that Asian Americans have higher rates of entrepreneurship, but that the rate of entrepreneurship for non-American Asians are substantially lower, adds to the literature by illustrating how entrepreneurship within ethnic groups differs by nationality or immigrant status. Furthermore, we document that the intergenerational persistence of entrepreneurship is substantially higher for East Asians. A growing literature emphasizes the importance of culture as a determinant for economic outcomes. However, quantifying culture is challenging and the literature has often used immigrant history, e.g., parent's original country, to proxy for culture (Fernández, 2011; Guiso et al., 2006). The findings of our paper show that such an approach should be examined with caution as entrepreneurial activities of individuals of the same ethnicity, age, and from very similar educational background differ significantly in their career choices depending on US citizenship status.

The rest of the paper proceeds as follows. Section 2 briefly reviews the prior literature on transitions to entrepreneurship. Section 3 describes the Stanford University Innovation Survey and Stanford University's two major entrepreneurship initiatives. Section 4 presents the empirical framework and Section 5 discusses the results. Section 6 concludes and discusses the policy implications.

2. Transition to entrepreneurship

Growth in the number of entrepreneurial firms has been linked to greater real economic growth in the U.S. (Wong et al., 2005). Innovation and entrepreneurship scholars have long been interested in the question of why some people transition to being entrepreneurs due to the impact of entrepreneurial behavior on economic growth and productivity (Schumpeter, 1934). Scholars have offered four categories of answers to this question: (1) financial and opportunity cost-based rationales, (2) cognitive differences, (3) demographic factors, and (4) training and experience effects. We review each of these briefly, yet focus on categories (3) and (4) as the most directly relevant to our research questions.

The first set of explanations for why some transition to entrepreneurship and others do not is that individuals with lower opportunity costs or with better access to financing are more likely to become entrepreneurs (Amit et al., 1995; Iyigun and Owen, 1998). For example, those with higher incomes or parents with greater levels of wealth are likely to have easier access to the funding needed to start a firm and as expected are more likely to become founders (Dunn and Holtz-Eakin, 2000; Blau, 1987). Employees at firms with a slowdown in sales growth are likely to have lower opportunity costs and correspondingly are more likely to found firms (Gompers et al., 2005).

A second set of answers emphasizes cognitive differences between entrepreneurs and non-entrepreneurs (Mitchell et al., 2000). Individuals lower in risk-aversion, higher in need for independence, and lower in their tendency towards counterfactual thinking and regret are more likely to become entrepreneurs (Douglas and Shepherd, 2000; Baron, 2000). Other studies find that individuals with moderate needs for achievement and power were more likely to become entrepreneurs (Roberts, 1991).

Third, demographic factors have also demonstrated predictive power in explaining who transitions to entrepreneurship. These factors

include religious background (McClelland, 1961), age (Levesque and Minniti, 2006; Roberts, 1991), and entrepreneurial parents (Dunn and Holtz-Eakin, 2000; Sørensen, 2007). Parental entrepreneurship has been found to increase the probability of children's entrepreneurship by about 60% in Sweden (Lindquist et al., 2015). Laspita et al. (2012) show the transmission of entrepreneurial intentions from parents to children from a cross-section of 15 countries. Men are significantly more likely than women to become entrepreneurs (Bates, 2002). Ethnic and immigration status has also been found to play a role with the likelihood of entrepreneurship being higher among some immigrant communities (Hart and Acs, 2011; Saxenian, 1999, 2006; Utterback et al., 1988). Language skills and the size of the ethnic market appear to moderate the impact of immigrant status on entrepreneurship (Evans and Leighton, 1989). Recent work has focused on the role of high skill migrants in bringing knowledge across regional (Marx et al., 2015) or national borders and influencing host country productivity (Canello, 2016) and innovative capacity (Filatotchev et al., 2011; Qin, 2015; Gibson and McKenzie, 2014). However, much of the work on immigration status examines the frequency of immigrants on founding teams (Kenney and Patton, 2015), rather than the likelihood of an immigrant becoming an entrepreneur. It also often fails to examine immigrants alongside first-generation children of immigrants who share ethnicity yet differ in language and cultural skills.

University training and other experience is a final category of explanations. Baumol (2005) argues that there are differences between the type of education needed for identifying entrepreneurial opportunities and that required for technical mastery. For example, Lazear (2005) uses a dataset of Stanford business school alumni to show that individuals with a greater variety of courses and job experiences were more likely to become founders. Universities, as a source of knowledge spillovers as well as social norms and exposure to entrepreneurship are increasingly cited as a factor in generating entrepreneurs (Bramwell and Wolfe, 2008; Dahlstrand, 1997; Oliver, 2004; Hsu et al., 2007; Guerrero et al., 2015). However, relatively little prior work explicitly examines the role of specific entrepreneurship education experiences or the impact of immigrant status as distinct from ethnicity in leading to entrepreneurial activity. We seek to address this important gap and in doing so respond to calls in the literature for additional examination of the role of context in entrepreneurship (Autio et al., 2014; Eesley, 2016; Nelson, 2014).

3. The Stanford University innovation survey and Stanford's entrepreneurship programs

3.1. The Stanford University innovation survey

The sample was constructed from a novel survey administered in 2011 to 142,496 alumni from Stanford University. The survey was conducted over a well-defined population of comparable individuals in multiple industries, and it was administered through official university channels and hence was more trustworthy to the respondents. By surveying the entire population (all living alumni who graduated between the 1930s and 2010s), we were able to poll all alumni who could have founded a firm. Though the sample of Stanford alumni is not representative of the general population, understanding entrepreneurship activity among students from a research university is critical to understanding the role of potentially high-growth entrepreneurship. Prior studies have found samples of alumni from research universities (MIT, Stanford, Harvard and Chicago) useful in making theoretical contributions regarding how the broader social environment influences entrepreneurs (Dobrev and Barnett 2005; Lazear, 2005; Burt 2001; Eesley and Roberts, 2012; Hsu et al., 2007; Eesley and Wang, 2017). Results based on this type of sample may generalize to other samples of selective-admission college-educated alumni. The sample suffers less from success bias than most datasets that condition on venture capital funding or an initial public offering. It is important to note that the

surveyed alumni are not selected based on successful entry into entrepreneurship. Unlike samples that focus on innovators or venture-backed founders, the results do not suffer from biases due to sampling on the dependent variable.

The 2011 survey generated 27,780 individual responses for a response rate of 19.5%. The response rates are similar across gender, departments, and graduation year. If we take graduates from 1933 to 1971, the response rate was 22% and graduates from 1972 to 2010, the response rate was 18%, indicating that older graduates were not less likely to respond. The Appendix A shows a multivariate regression predicting response to further assess response rate characteristics among the alumni sample. The dependent variable is equal to one if the individual responded to the survey and zero otherwise. Due to the large sample size, some variables are statistically significant. The first column indicates that women were 5.1% more likely to respond than men. Those in more recent graduation years were 0.9% less likely to respond. Graduates of the Education and Medical schools were more likely to respond and those from Law and Engineering were less likely to respond. Finally, we include fixed effects for graduation year, and a full set of interactions between gender and graduation year and school. In this model, we do not detect significant differences for the main effects of gender and school (see Eesley and Miller, 2012 for detailed benchmarking and response rate analyses). Out of the respondents, nearly 8000 reported being entrepreneurs who founded any type of organization (for-profit or non-profit) and 4290 said they had founded an incorporated business. This is the first journal article to use the Stanford University Innovation Survey.

An innovation ecosystem requires not only creative entrepreneurs but also active investors. Moreover, one of Silicon Valley's unique features is the abundance of entrepreneurs who become angel investors or form or join venture capital firms. These "entrepreneur investors" may better identify potentially successful start-ups and guide start-ups towards success at various stages of growth. The Stanford survey not only asks one's entrepreneurship status, but also whether one invested in start-ups. We are thus able to examine whether one was an angel or VC investor, or an entrepreneur investor, in addition to one's entrepreneurship status, i.e., whether one found a new organization. Responses include data on 2798 individuals who were early employees (16% of the alumni), 349 venture capital investors, and 2572 angel investors. Some 3600 respondents, 18%, said they had been on a private company board of directors.

Another important value of the Stanford Innovation Survey is the rich information on ethnicity and nationality of the students with a particular emphasis on Asians, which this paper probes into. Each respondent was asked to identify his or her ethnicity as white, black, Hispanic, Native American, Chinese, Indian, Other Asian, and Other. Furthermore, respondents were asked to name the country of citizenship while at Stanford University. The detailed information on both ethnicity and nationality, enable us to examine the differences in entrepreneurial activity within the same ethnic groups across nationality status, e.g., Chinese Americans versus Chinese non-Americans.

Another valuable component of the survey is the information on whether the respondent's parents had entrepreneurship experience. The literature has found parental entrepreneurship status to be one of the strongest determinants of entrepreneurship in different countries. We are able to exploit the rich ethnicity and nationality information and parental entrepreneurship status to examine whether the intergenerational correlation of entrepreneurship differs by different ethnic and nationality groups.⁴

The survey also asks a set of questions that characterize how optimistic and positive the respondents are. In particular, it asks

⁴ Personal and family wealth are also important determinants of entrepreneurship. Unfortunately, the survey did not collect information on personal or family wealth. Hence, we are not able to control for these factors in the empirical analysis.

Table 1
Summary statistics.

Variable	Mean	Std. Dev.	Min	Max	Obs
Entrepreneurship	0.32	0.47	0	1	13465
Invest as an angel or venture capital	0.10	0.31	0	1	13465
Entrepreneur Investor	0.07	0.26	0	1	13465
Incorporated company	0.32	0.47	0	1	13465
Unincorporated business	0.10	0.31	0	1	13465
Partnership	0.07	0.26	0	1	13465
Informal business	0.06	0.24	0	1	13465
Stanford graduating year	1985.86	16.65	1940	2010	13465
Graduate degree	0.71	0.45	0	1	13465
Age	49.81	16.54	21	93	13465
Female	0.37	0.48	0	1	13465
Asian only	0.15	0.36	0	1	13465
White only	0.73	0.44	0	1	13465
Black only	0.02	0.14	0	1	13465
Hispanic only	0.04	0.19	0	1	13465
Other ethnicity	0.06	0.24	0	1	13465
Foreign national	0.15	0.35	0	1	13465
China	0.01	0.08	0	1	13465
Japan	0.01	0.10	0	1	13465
Korea	0.01	0.07	0	1	13465
Taiwan	0.01	0.07	0	1	13465
India	0.01	0.11	0	1	13465
Open to new experience	4.19	0.75	1	5	13261
Expect more good things	4.34	0.69	1	5	13269
Expect the best in difficult times	3.63	0.89	1	5	13274
Parent entrepreneurial experience	0.18	0.38	0	1	13465
Participate in Center for Entrepreneurship Studies	0.02	0.14	0	1	12646
Participate in Stanford Technology Ventures Program	0.03	0.17	0	1	12641

Notes: Data from the Stanford Alumni Survey. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities.

respondents to rate the degree to which one agrees with the following statements: “I am open to new experiences”, “In uncertain times, I usually expect the best.”, and “Overall, I expect more good things to happen to me than bad.” We use these variables to control for the underlying character of the individual and to examine how optimism differs by ethnicity and nationality. Table 1 presents the summary statistics of the main variables used in the analysis.

3.2. Stanford University’s entrepreneurship programs

Stanford University is well known for its supportive environment for entrepreneurship among students and faculty. The stories of the founding of Hewlett-Packard and Google are two of many examples. Stanford University further expanded and formalized its support for entrepreneurship by establishing two initiatives – the Center for Entrepreneurial Studies and the Stanford Technology Ventures Program – in the mid-1990s. The Center for Entrepreneurial Studies (CES) was founded in 1996 at the Graduate School of Business to address the needs facing entrepreneurs and the entrepreneurial community. It is a collaborative effort that spans the whole university and supports research and teaching in a variety of ways. For students, the CES offers a variety of courses that touch upon the various aspects of entrepreneurship. These courses cover topics ranging from management, finance, technology, law, education, design, etc., and are accessible to both graduate and undergraduate students. Furthermore, experiential opportunities where students can learn the day-to-day activities of a start-up or test out new business concepts are offered through the CES. The Stanford Technology Ventures Program (STVP) is the entrepreneurship center founded in 1995 at the Engineering School. STVP offers courses and extracurricular programs to students as well as support research on high-technology entrepreneurship. The STVP houses several fellowship programs where students can get in-depth

knowledge and experience of technology start-ups, and a variety of courses are offered through the Engineering School. The Stanford Innovation Survey asks whether each respondent had participated in the CES or STVP as a student and to rate the degree of participation in a 1–4 scale, where 1 indicates no participation, 2 little participation, 3 moderate participation, and 4 heavy participation. We later use this information to examine whether participation in this program changes the differential patterns of entrepreneurship as well as how participation differs by groups.

4. The empirical framework

The base regression we use to examine the differences in entrepreneurship by ethnicity and nationality is the following:

$$y_{ijkl} = \alpha + \sum_n \beta^n D_i^n + \sum_n \gamma^n D_i^n F_i + X_i \pi + \mu_j + \theta_k + \rho_l + \varepsilon_{ijkl} \quad (1)$$

where y_{ijk} represents the entrepreneurship status of individual i in age cohort j , Stanford graduating cohort k , and Stanford graduating department l . D_i^n is the ethnicity of individual i where n represent the different ethnicity groups, i.e., Chinese, Indian, other Asian, Hispanic, black, and rest, with white as the omitted category. F_i is a dummy variable equal to one if the individual was a foreign national when at Stanford as a student, and X_i is the vector of control variables that include the foreign dummy, gender dummy, parental entrepreneurship dummy, graduate degree dummy, and the three variables that proxy for optimism. We control for the age of the individual non-parametrically by including age fixed effects μ_j , and further control for Stanford cohort effects by including Stanford graduation year fixed effects θ_k . Since different types of students select into different departments, we also control for department fixed effects ρ_l . In essence, we are comparing the entrepreneurship status by ethnicity among students within the same department with the same age and graduating year.

The main coefficients of interests are the β^n 's which identify the relative difference across different ethnic groups, and the γ^n 's which identify the differences between US citizens and non-US citizens within ethnic group n . We estimate the above with a linear probability model as well as logit regressions. The results are similar and we present results from the linear probability regressions.

In other specifications, we examine whether the inclusion of the individual’s participation status or participation level in the entrepreneurship programs, i.e., the CES and the STVP, in Eq. (1) alters the coefficient estimates of the γ^n 's. We also examine participation in the program, measures of optimism, and parental entrepreneurship status as the outcome variable y_{ijk} in Eq. (1) to examine differential selection by ethnicity and nationality.

Finally, when examining the intergenerational correlation of entrepreneurship, we estimate the following equation

$$y_{ijkl} = \alpha + \sum_n \kappa^n D_i^n P_i + X_i \pi + \mu_j + \theta_k + \rho_l + \varepsilon_{ijkl} \quad (2)$$

where P_i is a dummy variable equal to one if the individual i 's parent was an entrepreneur. The coefficient κ^n identifies the intergenerational correlation of entrepreneurship for group n . A higher value of κ^n implies that persistence in entrepreneurship across generations is high, or that individuals without a parent as entrepreneur are less likely to become entrepreneurs.

5. Results

5.1. Entrepreneurship and start-up investment patterns of Stanford alumni

Table 2 examines how entrepreneurship and start-up investment activities of Stanford alumni differ by ethnicity. Four ethnicities – Asian, Black, Hispanic, and other- are reported where white is the omitted category. A simple regression that additionally controls gender,

Table 2
Entrepreneurship by ethnicity.

VARIABLES	(1) Entrepreneur	(2) Entrepreneur	(3) Entrepreneur	(4) Entrepreneur	(5) Angel or VC investor	(6) Entrepreneur Investor	(7) Incorporated company	(8) Unincorporated business
Asian	−0.104*** (0.0103)	−0.0195* (0.0117)						
Other Asian			−0.0909*** (0.0168)	−0.0684*** (0.0163)	−0.0240** (0.0104)	−0.0309*** (0.00819)	−0.0368*** (0.0135)	−0.0340*** (0.0124)
Chinese			0.00644 (0.0155)	0.0153 (0.0151)	0.0201* (0.0108)	0.0104 (0.00924)	0.0149 (0.0131)	0.00369 (0.0119)
Indian			0.0478* (0.0246)	0.0444* (0.0244)	−0.00765 (0.0151)	−0.0111 (0.0129)	0.0307 (0.0210)	0.00303 (0.0184)
Black	0.0216 (0.0252)	0.0735*** (0.0278)	0.0741*** (0.0278)	0.0775*** (0.0271)	−0.0162 (0.0153)	−0.0184 (0.0123)	0.0243 (0.0211)	0.0432* (0.0221)
Hispanic	−0.0538*** (0.0181)	0.00389 (0.0194)	0.00399 (0.0194)	−0.00599 (0.0191)	−0.0149 (0.0124)	−0.00488 (0.0112)	0.00348 (0.0158)	0.0436** (0.0175)
Other	−0.0119 (0.0148)	0.0663*** (0.0160)	0.0671*** (0.0160)	0.0634*** (0.0153)	−0.0171* (0.00924)	−0.00888 (0.00802)	0.0410*** (0.0129)	0.0373*** (0.0131)
Foreign	0.0561*** (0.0110)	0.0688*** (0.0125)	0.0689*** (0.0126)	0.0615*** (0.0122)	0.0260*** (0.00905)	0.0257*** (0.00814)	0.0773*** (0.0114)	0.00244 (0.0103)
Graduate degree	0.00647 (0.00768)	−0.0242*** (0.00938)	−0.0247*** (0.00936)	−0.0243*** (0.00911)	−0.00809 (0.00592)	−0.00127 (0.00498)	−0.0137* (0.00747)	−0.00640 (0.00757)
Female	−0.161*** (0.00707)	−0.114*** (0.00867)	−0.113*** (0.00867)	−0.110*** (0.00847)	−0.0597*** (0.00532)	−0.0511*** (0.00440)	−0.103*** (0.00649)	−0.0496*** (0.00688)
Parent entrepreneurship				0.193*** (0.0105)	0.0614*** (0.00778)	0.0589*** (0.00701)	0.116*** (0.00942)	0.105*** (0.00940)
Open to new experience				0.0152** (0.00626)	0.0190*** (0.00418)	0.0147*** (0.00356)	0.00772 (0.00523)	0.00672 (0.00513)
Expect the best				0.0137*** (0.00529)	−0.00580 (0.00369)	−0.00341 (0.00325)	0.0152*** (0.00449)	0.00176 (0.00438)
Expect more good things				0.0993*** (0.00610)	0.0190*** (0.00404)	0.0222*** (0.00349)	0.0608*** (0.00502)	0.0640*** (0.00489)
Age FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Graduation year FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Department FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,361	13,465	13,465	13,222	13,222	13,222	13,222	13,222
R-squared	0.035	0.125	0.127	0.182	0.112	0.106	0.144	0.106

Notes: Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The number of observations in column (1) is higher than the other columns because column (1) does not include any fixed effects, whereas column (2) onwards includes all 3 (age, graduation year, and department) fixed effects. Some respondents did not provide information on birth year, graduation year, or the name of their departments. Hence, including the fixed effects reduces the sample size. Including age fixed effects reduces the sample size to 17,343. Additionally, including the graduation year fixed effects reduces the sample size to 16,202. Finally, adding the department fixed effects reduces the sample size to 13,465.

foreign status, and whether one has a graduate degree in column (1) indicates that the share of Asians that found a new organization is 10% points lower than that of whites. Entrepreneurship among Hispanics is about 5.4% lower than whites. These effects are statistically significant at the one percent level. The ethnic composition and characteristics of students admitted to Stanford would likely differ by age, year, and department. Hence, we focus on the within age, cohort, and department variation in entrepreneurship by including age, Stanford graduation year, and Stanford graduating department fixed effects in column (2) and onward. The coefficient estimate on Asian decreases in magnitude to -0.02 but is still statistically significant at the one percent level. In column (3) we further separate the Asian category into Chinese, Indian, and other Asian. The coefficient estimates on Chinese and Indian are not statistically significant at the 5% level. However, the coefficient estimate on other Asian is -0.09 and is statistically significant.⁵ Column (4) additionally controls for the determinants of entrepreneurship that the literature has found to be important. The entrepreneurship literature has found that whether one's parent was an entrepreneur to be one of the strongest determinants of entrepreneurship (Fairlie, 1999; Djankov et al., 2007). We ask whether either of the respondent's parents had entrepreneurship experience and include this in column (4). Also, personal beliefs especially relating to optimism is found to have significant effects on entrepreneurship. We ask each

respondent the degree to which one is open to new experiences, expect the best in difficult times, and expect more good things to happen in a 1–5 scale. Including these variables does not alter the significance and only slightly alters the magnitudes of the coefficient estimates. Now, other Asians on average have about a 6.8% lower probability of becoming an entrepreneur.

Investment in start-ups is also an important part of the innovation ecosystem. In column (5) we examine whether one's experience in investment as an angel investor or venture capitalist differs by ethnicity. Again, the share of other Asians that become angel or VC investors are about 3% points lower than whites. One of the unique features of the Silicon Valley venture capitalists is that many have their own start-up experience. In column (6) we examine whether such entrepreneur investor status differs by ethnicity. Again, the other Asian group has a significantly lower share than other ethnic categories. The following two columns examine whether the start-up was an incorporated firm or an unincorporated business.⁶

Results in Table 2 present a consistently lower participation in entrepreneurship and start-up investment among Asians.⁷ In Table 3, we include each ethnicity interacted with whether one was of foreign nationality as a student when attending Stanford University. Separating

⁶ The other Asian category has significantly lower start-up rates in both incorporated firms and unincorporated businesses.

⁷ Though whether one is a US citizen or not is controlled for in Table 2, the results do not reflect any differences across foreign status among the different ethnic groups.

⁵ The negative difference in entrepreneurship with whites is predominantly due to the other Asian groups, which is about 50% Japanese and 22% Korean.

Table 3
Entrepreneur and investor status based on ethnicity and nationality.

VARIABLES	(1) Entrepreneur	(2)	(3) Angel or VC investor	(4)	(5) Entrepreneur Investor	(6)
Asian	0.0335** (0.0133)		0.00576 (0.00856)		−0.000182 (0.00703)	
Other Asian		−0.0135 (0.0202)		−0.0325*** (0.0103)		−0.0301*** (0.00731)
Chinese		0.0411** (0.0177)		0.0290** (0.0126)		0.0168 (0.0105)
Indian		0.107*** (0.0343)		0.0116 (0.0196)		0.00479 (0.0162)
Black	0.0776*** (0.0286)	0.0779*** (0.0286)	−0.0178 (0.0157)	−0.0176 (0.0157)	−0.0186 (0.0125)	−0.0185 (0.0125)
Hispanic	−0.0300 (0.0204)	−0.0299 (0.0204)	−0.0257** (0.0118)	−0.0256** (0.0118)	−0.0114 (0.0104)	−0.0113 (0.0104)
Other	0.0522*** (0.0164)	0.0528*** (0.0164)	−0.0136 (0.00942)	−0.0134 (0.00942)	−0.00954 (0.00781)	−0.00938 (0.00781)
Asian*Foreign	−0.120*** (0.0249)		−0.0204 (0.0178)		−0.0228 (0.0156)	
Other Asian*Foreign		−0.145*** (0.0340)		0.0167 (0.0239)		−0.00445 (0.0195)
Chinese*Foreign		−0.0917*** (0.0329)		−0.0281 (0.0242)		−0.0207 (0.0212)
Indian*Foreign		−0.139*** (0.0487)		−0.0391 (0.0302)		−0.0330 (0.0260)
Black*Foreign	0.00254 (0.0862)	0.00331 (0.0861)	0.0177 (0.0658)	0.0188 (0.0658)	0.000845 (0.0560)	0.00172 (0.0560)
Hispanic*Foreign	0.0901* (0.0510)	0.0905* (0.0510)	0.0436 (0.0398)	0.0446 (0.0397)	0.0253 (0.0368)	0.0261 (0.0367)
Other*Foreign	0.0657 (0.0447)	0.0663 (0.0447)	−0.0261 (0.0321)	−0.0249 (0.0320)	0.00161 (0.0312)	0.00255 (0.0312)
Foreign	0.0908*** (0.0167)	0.0897*** (0.0167)	0.0307** (0.0127)	0.0296** (0.0125)	0.0306*** (0.0116)	0.0296*** (0.0115)
Base controls	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Graduation year FE	Yes	Yes	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,222	13,222	13,222	13,222	13,222	13,222
R-squared	0.183	0.184	0.112	0.113	0.106	0.107

Notes: Base controls include gender, whether one received a graduate degree, parental entrepreneurship, and the three measures of optimism. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

out Asian Americans presents an interesting pattern in column (1). Asian Americans have a statistically significant higher start-up rate than white-Americans by about 3.3% points. However, Asians of foreign nationality have a substantially lower start-up rate than Asian Americans, by 12% points. We separate the Asian category into the three groups as before in column (2). The higher rate of start-up among Asian Americans is driven by Chinese and Indian Americans. The coefficient estimate on other Asian Americans is negative but not statistically significant. However, when we examine the coefficient estimates on the Asian sub-groups interacted with the dummy variable for foreign nationality when at Stanford, all three estimates are negative and statistically significant. The following columns report results for the same regression but with angel or VC investment and entrepreneur investor as the outcome variable. Chinese Americans have a higher rate of investment activity compared to white Americans, and the other Asian Americans have a statistically lower rate of investment activity compared to white-Americans.⁸

⁸ We further explore the nationality of foreign students. Among foreign students with Asian ethnicity about 50% are Japanese and 22% are Korean. In Table A2 column (1) we sub-divide the other Asian foreign student category into Korean, Japanese, and other Asian. Within this sub-sub-category, the other Asian now excludes Korean, Japanese, Chinese, and Indian. The coefficient estimates on the three sub-sub-groups are all negative and statistically significant. The coefficient estimate on the Japanese sub-group is quite large in magnitude at −0.24 and statistically significant at the one percent level. The coefficient estimates on the Korean sub-group and other Asian sub-group are −0.05 and −0.08 and the latter is statistically significant at the 10% level. The cell sizes become smaller as we subdivide the groups and detecting statistical significance becomes more challenging. However, even at this sub-sub-division level we find persistently lower

Whether the graduates start their businesses in the US or outside the country is of considerable policy relevance. The survey did ask the location of the startups, but about 45% of entrepreneurs did not respond to that question. Noting that the sample may not be representative of all alumni, we examine which entrepreneurs locate their startups in the US. First, among those who provided information on the country of startup, 84.7% were located in the US (3893 out of 4598). If we separate this out between US citizens and non-US citizens at time of graduation, about 95% of US citizens (2964 out of 3124) started their businesses in the US, and about 63% of non-US citizens (545 out of 929) started their businesses in the US. These statistics indicate that there are substantially more foreign students who create their businesses in the US, rather than their home or a third country, at least among the sample of respondents. Given, that many foreign students need to go through the extra hurdle of working and staying in the US after graduation because of their Visa status, the results suggests that many immigrant entrepreneurs prefer the US as their startup location and the percentage could be even higher if policies can facilitate foreign citizens to start businesses in the US.

We also examine entrepreneurship in the US based on ethnicity and nationality excluding alumni who have started their businesses outside the US. The results are presented in columns (2) to (4) of Table A2.

(footnote continued)

entrepreneurship rates from students coming from Asia compared to their Asian American counterparts. The differences between Asian Americans and their Asian counterparts in terms of investment activity, other than for the Koreans, are not as stark compared to the entrepreneurship results.

Other than the negative coefficient estimate on other Asian-Americans, there are no statistically significant differences among the different ethnicities and nationality. However, the estimates are positive for Indian-Americans and Chinese-Americans. We additionally run a regression that examines who reports the country of startup among entrepreneurs in column (5). We find no significant ethnicity or nationality effects but the coefficient estimates on the Asian-American variables tend to be negative and relatively large in magnitude. Asian-Americans maybe less likely to report the business' location. Given the substantial non-reports on country of startup and the potential reporting bias by ethnicity and nationality, one needs to be careful in interpreting and generalizing from these results.⁹

5.2. University entrepreneurship program participation

The stark difference between Asian Americans and Non-American Asians in entrepreneurship suggests that despite the persistent cultural traits shared by the Asian sub groups, the difference in institutional and educational upbringing in the US generates large differences in start-up activity. A natural question is whether these differences within the Asian ethnic subgroups decrease as foreign Asian students attend US universities and take advantage of the university entrepreneurship programs. In this section, we examine whether the two major entrepreneurship programs initiated by Stanford University, the Center for Entrepreneurial Studies (CES) and the Stanford Technology Ventures Program (STVP), affect the differences in entrepreneurship activity between US and foreign Asian subgroups.

In Table 4, we first examine the relationship between entrepreneurship status and participation in the two programs as a student. Column (1) of Panel A indicates that participation in CES is associated with a 17% higher probability of being an entrepreneur, and STVP is associated with a 6.1% higher probability. Though they are both statistically significant at the one percent level, participation in CES is more than three times more likely to result in start-up activity after graduation. Due to self-selection in participation, we caution against a causal interpretation of these results. In column (2) we examine how program participation relates to future start-up investment as an angel investor or VC. Results indicate that CES participation is positively and significantly related to future investor status. However, STVP participation is not significantly related to investor status. Similar results hold when we examine entrepreneur investor as the outcome variables. Lastly, we examine whether the respondent used Stanford networks when looking for funding or partners for his or her start-up. Participation in both programs is positively related to the utilization of Stanford networks but CES participation is about three times more strongly related than STVP participation. Though both programs aimed to help promote entrepreneurial activity among students, the CES program is more strongly related to entrepreneurship than the STVP program. In terms of investment in start-ups, either as an angel investor, venture capital, or entrepreneur investor, only CES participation shows a significant relationship. Though Stanford promotes and has a strong tradition in technology start-ups, the CES, which is the more general entrepreneurship program, compared to the STVP, which has a stronger technology focus, is related to more and broader aspects of future entrepreneurial activity. Panel B examines the relationship between the level of participation in these programs, which were coded in a 1–4 scale, and entrepreneur status. No participation was coded as 1 and extensive participation as 4. The results imply that more extensive participation in either program is positively related to all four outcome

⁹ Some of the respondents provided city information when asked about the location of their startup. Again among this selected sample we find that 14.4% of those who provide city information (629 out of 3739) started their enterprise in Silicon Valley, where Silicon Valley is defined by the major cities in Santa Clara County. (Specifically, San Jose, Palo Alto, Mountain View, Cupertino, Sunnyvale, Los Altos, Milpitas, Campbell and Saratoga.) Trying different combinations of Silicon Valley cities returns similar results.

Table 4
Entrepreneurship status and Stanford entrepreneurship program participation.

VARIABLES	(1) Entrepreneur	(2) Angel or VC investor	(3) Entrepreneur Investor	(4) Utilize Stanford network for funding
<i>A. Program participation</i>				
Participate in CES	0.171*** (0.0317)	0.0815*** (0.0279)	0.0497** (0.0249)	0.203*** (0.0524)
Participate in STVP	0.0612*** (0.0232)	0.00902 (0.0169)	0.0106 (0.0144)	0.0743*** (0.0283)
R-squared	0.180	0.113	0.107	0.055
<i>B. Level of participation</i>				
Level of participation in CES	0.109*** (0.0129)	0.0691*** (0.0124)	0.0710*** (0.0120)	0.200*** (0.0268)
Level of participation in STVP	0.0535*** (0.0107)	0.0261*** (0.00876)	0.0214*** (0.00774)	0.0449*** (0.0130)
R-squared	0.185	0.119	0.115	0.085
Base controls	Yes	Yes	Yes	Yes
Ethnicity	Yes	Yes	Yes	Yes
Ethnicity*Foreign	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes
Graduation year FE	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes
Observations	12,454	12,454	12,454	12,389

Notes: Base controls include gender, whether one received a graduate degree, parental entrepreneurship, and the three measures of optimism. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

variables. However, CES participation level is quantitatively a much stronger predictor than STVP participation level for all outcomes.

We then examine whether controlling for one's participation in Stanford University's entrepreneurship program reduces the entrepreneurship difference between US citizens and non-citizens within the Asian ethnic subgroups. Table 5 presents regression results similar to Table 3, but additionally includes one's participation status in the CES and the STVP. The coefficient estimates on the other Asian dummy and foreign dummy interaction in column (1) of Table 5 slightly decreases to -0.135 from -0.145 of Table 3 column (2). Similarly, the triple interaction terms on Table 5 column (2) are similar or slightly smaller in magnitude than those from Table 3 column (3). However, the differences between the estimates are not statistically different. Program participation may be slightly reducing the within Asian ethnic subgroup differences in entrepreneurship but the effects are weak and not statistically distinguishable.

In Table 6, we examine whether there is selective participation into the entrepreneurship programs by foreign status within Asians. Column (1) indicates that participation in the CES among non-American Asians is about 2% points lower than Asian Americans. This effect is statistically significant at the 5% level. Once we subdivide this group in column (2) the statistical significance goes away but the coefficient estimates are all negative. Columns (3) and (4) examine differential participation in the STVP. As column (3) indicates Asian Americans have higher participation in the STVP than white Americans, and non-American Asians are as likely to participate in the STVP. Similar results hold when we examine the participation levels in the CES and the STVP in the following columns. The differential results tend to be statistically stronger when we examine participation levels in CES in columns (5) and (6). The intensity of participation in the CES is significantly lower for other Asian Americans as well.

Table 6 results could be influenced by the fact that the majority of participants to the two main programs are from a specific school (i.e. Business School for CES and Engineering School for STVP). We also performed sensitivity tests by running the same regression on the subsample of individuals who graduated from either school. The results

Table 5
Program participation and entrepreneurial outcomes.

VARIABLES	(1) Entrepreneur	(2) Angel or VC investor	(3) Entrepreneur Investor
Participate in CES	0.164*** (0.0319)	0.0835*** (0.0280)	0.0507** (0.0250)
Participate in STVP	0.0581** (0.0233)	0.00605 (0.0169)	0.00861 (0.0144)
Other Asian	-0.0122 (0.0204)	-0.0318*** (0.0106)	-0.0296*** (0.00751)
Chinese	0.0401** (0.0180)	0.0291** (0.0130)	0.0157 (0.0107)
Indian	0.0931** (0.0368)	0.00613 (0.0204)	-0.00332 (0.0160)
Black	0.0833*** (0.0294)	-0.0142 (0.0163)	-0.0158 (0.0130)
Hispanic	-0.0282 (0.0209)	-0.0243** (0.0122)	-0.0102 (0.0107)
Other	0.0510*** (0.0166)	-0.0161* (0.00933)	-0.00904 (0.00789)
Other Asian*Foreign	-0.135*** (0.0351)	0.0272 (0.0252)	0.00363 (0.0206)
Chinese*Foreign	-0.0970*** (0.0340)	-0.0256 (0.0253)	-0.0182 (0.0220)
Indian*Foreign	-0.138*** (0.0519)	-0.0243 (0.0323)	-0.0202 (0.0272)
Black*Foreign	-0.0330 (0.0896)	0.0316 (0.0690)	0.0141 (0.0586)
Hispanic*Foreign	0.0909* (0.0520)	0.0306 (0.0407)	0.0190 (0.0374)
Other*Foreign	0.0637 (0.0458)	-0.0163 (0.0335)	0.0105 (0.0325)
Foreign	0.0884*** (0.0175)	0.0274** (0.0131)	0.0269** (0.0120)
Base controls	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes
Graduation year FE	Yes	Yes	Yes
Department FE	Yes	Yes	Yes
Observations	12,341	12,341	12,341
R-squared	0.186	0.114	0.107

Notes: Base controls include gender, whether one received a graduate degree, parental entrepreneurship, and the three measures of optimism. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

were qualitatively similar to the full sample results. The estimates on the various Asian categories have the same sign and similar significance levels.

5.3. Parental entrepreneurship and the intergenerational persistence in entrepreneurship

We have documented that there are substantial differences in the entrepreneurial activities between Asian Americans and non-American Asians. Moreover, they also differ significantly in their participation in university entrepreneurship initiatives. Why are non-American Asians less entrepreneurial and utilize entrepreneurship training to a lesser degree? In this section, we examine whether the two known determinants of entrepreneurship, optimism and parental entrepreneurship, which we examine in the survey differ by ethnicity and foreign status. Table 7 columns (1) and (2) examine optimism. We construct the optimism variable by adding the three variables: open to new experiences, expect the best in difficult times, and expect more good things to happen. Column (1) indicates that Asian Americans are significantly less optimistic than white Americans, but that non-American Asians are significantly more optimistic than their Asian American counterparts. The difference in optimism is in the opposite directions from our previous findings on entrepreneurship and program participation. Dividing the Asian category into column (2) indicates that the lower level of

optimism is driven by those of non-Indian ethnicity, i.e., the Chinese American and the other Asian American categories. Moreover, the higher level of optimism in non-American Asians is driven by the optimism of Indians. This may reflect the cultural and religious beliefs of Indians.

We turn to parental entrepreneurship status in columns (2) to (3). Column (3) indicates that Asian Americans are less likely to have a parent with entrepreneurship experience than white Americans by 2.7% points, and furthermore non-American Asians are less likely than Asian Americans to have a parent with entrepreneurship experience by about 3.1% points, but the latter estimate is not statistically significant. Dividing the Asian category in column (4) shows negative coefficient estimates for the Asian American subgroups as well as negative estimates for the non-American Asians. Overall, the results indicate that parental entrepreneurship is lower among Asian Americans and even more so for East Asians. Given that parental entrepreneurship status is one of the strongest and most persistent predictors of entrepreneurship, the low parental entrepreneurship rate among East Asians presents a hurdle in promoting entrepreneurship in these communities.

Finally, given the importance of parental entrepreneurship in determining entrepreneurship among Stanford alumni, and the relatively lower levels of entrepreneurship among East Asians, we examine whether the intergenerational correlation of entrepreneurship differs by ethnicity and nationality. Table 8 column (1) presents the intergenerational correlation estimates of entrepreneurship among ethnicities. White respondents who had a parent as an entrepreneur are 22.4% more likely to become an entrepreneur. This intergenerational correlation is not statistically different between ethnic groups.

In columns (2) we examine the intergenerational correlation across different nationalities. Included nationalities are the US, China, Japan, Korea, and Taiwan, and India. The coefficient estimate on parental entrepreneurship implies that the intergenerational correlation of entrepreneurship is around 0.23 for the excluded nationalities. The coefficient estimate on the interaction term with the US is basically zero implying a similar magnitude for citizens from the US. However, the intergenerational correlation jumps up for most East Asian citizens. In particular, the coefficient estimate on the interaction term with Korean is 0.28 and statistically significant. This implies that the intergenerational correlation of entrepreneurship among Koreans is 0.51. Having a parent with entrepreneurial experience increases one's probability of becoming and entrepreneur by 51% in Korea. A higher intergenerational correlation implies more persistence in entrepreneurship across generations, or that the probability that someone from a non-entrepreneur household to start a business is lower. The coefficient estimate on the Japanese term is 0.14 but statistically insignificant, but the estimate on the Chinese interaction term is large at 0.52 and highly significant. This implies that the intergenerational correlation of entrepreneurship is extremely high at 0.75. The estimate for Indians is small and insignificant, but the estimate for Taiwanese is 0.23 and significant at the 10% level. In column (3), we examine whether the intergenerational correlation of entrepreneurship within each nationality differs between alumni who graduated before 1997 and on or after 1997. We use 1997 as the cut off because this is when the entrepreneurship programs were available to graduating cohorts. Including the triple interaction terms generally makes the standard errors larger since we lose power by splitting the cells. The coefficient estimates on the interaction terms now represent the intergenerational correlation relative for the period before 1997. The estimates are similar in magnitude to those from column (2), except for the Chinese, which decreases to 0.29. This in turn is reflected in the large coefficient estimate on the triple interaction term of 0.4 for the Chinese alumni. The triple interaction term represents the differential in the intergenerational correlation estimate after 1997 for each nationality. So, for Chinese, parental entrepreneurship status has become significantly more important in determining one's entrepreneurial status after 1997.

Overall, the results in this section show that the level of parental

Table 6
Program participation by ethnicity and nationality.

VARIABLES	(1) Participate in CES	(2)	(3) Participate in STVP	(4)	(5) Participation level in CES	(6)	(7) Participation level in STVP	(8)
Asian	0.00106 (0.00500)		0.0152** (0.00706)		0.0328 (0.0370)		0.0762 (0.0472)	
Other Asian		−0.0132** (0.00548)		−0.00291 (0.00958)		−0.0938** (0.0435)		0.00484 (0.0658)
Chinese		0.00482 (0.00715)		0.0173* (0.00986)		0.0731 (0.0547)		0.0703 (0.0655)
Indian		0.00303 (0.0144)		0.0420* (0.0232)		0.119 (0.103)		0.233* (0.134)
Black	0.00194 (0.00996)	0.00158 (0.00997)	0.0179 (0.0141)	0.0179 (0.0141)	0.0746 (0.0822)	0.0739 (0.0824)	0.288** (0.133)	0.289** (0.133)
Hispanic	−0.000203 (0.00766)	−0.000588 (0.00766)	−0.00408 (0.00893)	−0.00430 (0.00893)	0.0511 (0.0682)	0.0497 (0.0682)	0.0513 (0.0910)	0.0494 (0.0910)
Other	0.00414 (0.00621)	0.00381 (0.00622)	0.00223 (0.00742)	0.00224 (0.00743)	0.0193 (0.0407)	0.0170 (0.0407)	0.0463 (0.0579)	0.0459 (0.0579)
Asian*Foreign	−0.0204** (0.0102)		−0.00172 (0.0143)		−0.205*** (0.0762)		−0.138 (0.0953)	
Other Asian*Foreign		−0.0131 (0.0120)		−0.00901 (0.0172)		−0.0446 (0.104)		−0.156 (0.131)
Chinese*Foreign		−0.0117 (0.0140)		0.00132 (0.0204)		−0.242** (0.0951)		−0.0986 (0.126)
Indian*Foreign		−0.0273 (0.0193)		0.00336 (0.0345)		−0.326** (0.128)		−0.215 (0.176)
Black*Foreign	0.0426 (0.0553)	0.0436 (0.0553)	0.0103 (0.0601)	0.0103 (0.0601)	0.268 (0.315)	0.275 (0.315)	−0.438 (0.337)	−0.432 (0.338)
Hispanic*Foreign	−0.00822 (0.0272)	−0.00721 (0.0272)	−0.0100 (0.0262)	−0.0101 (0.0262)	−0.131 (0.179)	−0.126 (0.179)	−0.173 (0.201)	−0.166 (0.201)
Other*Foreign	0.00467 (0.0227)	0.00575 (0.0227)	−0.0296 (0.0199)	−0.0297 (0.0199)	−0.129 (0.109)	−0.125 (0.108)	−0.277 (0.206)	−0.271 (0.205)
Foreign	0.00313 (0.00711)	0.00211 (0.00704)	0.0179** (0.00819)	0.0179** (0.00819)	0.0598 (0.0569)	0.0556 (0.0566)	0.232*** (0.0648)	0.226*** (0.0641)
Base controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Graduation year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,445	12,445	12,440	12,440	2312	2312	2647	2647
R-squared	0.132	0.132	0.071	0.072	0.373	0.375	0.169	0.171

Notes: Base controls include gender, whether one received a graduate degree, parental entrepreneurship, and the three measures of optimism. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

entrepreneurship is lower among East Asians but the degree of intergenerational correlation in entrepreneurship is substantially higher. These characteristics reflect the relatively lower level of entrepreneurship and participation in university entrepreneurship programs among Asians, and in particular, non-American Asians.

6. Conclusion

This paper examines the persistence and differences in entrepreneurship among Stanford alumni by ethnicity and nationality. We find that among Stanford alumni, Asian Americans have a higher rate of entrepreneurship than white Americans. However, non-American Asians have a substantially lower, by about 12% points, start-up rate than Asian Americans. Such discrepancy not only holds for entrepreneurial choice but also for investing as an angel investor or VC, or utilizing Stanford networks to find funding sources or partners. Participation in the entrepreneurship programs as a student does little to reduce this gap. Furthermore, non-American Asians have lower participation rates in Stanford University's entrepreneurship education program, compared to their Asian American counterparts. We find that parental entrepreneurship status is one of the strongest and most persistent predictors of entrepreneurship, and we find that parental entrepreneurship is lowest among Asians, especially non-American Asians. Moreover, these groups have high intergenerational persistence in entrepreneurship, i.e., a high correlation between one's entrepreneurship status and one's parents' entrepreneurship status. The intergenerational correlation of entrepreneurship is very high for East

Asians, e.g., 0.51 for Koreans and 0.75 for Chinese, compared to 0.23 for US citizens. This value for US citizens does not differ by ethnicity. The low level of parental entrepreneurship and the high degree of intergenerational correlation in entrepreneurship among Asians likely result in the lower level of entrepreneurship and participation in university entrepreneurship programs among Asians relative to their Asian American counterparts.

Our work further develops and builds on the line of literature emphasizing the importance of the institutional and social context in entrepreneurship (Autio et al., 2014; Eesley, 2016; Eesley et al., 2016). Prior research on academic entrepreneurship has emphasized certain ways that academic knowledge is transferred to industry, for example, university technology licensing, spin-offs (Dahlstrand, 1997; Goldfarb and Henrekson, 2003; Murray, 2002, 2004), academic publications (Zhang et al., 2013), and professorial consulting (Bramwell and Wolfe, 2008; Guerrero et al., 2015). However, recent work suggests another important mechanism in the knowledge related to entrepreneurship provided to students and alumni via research universities (Eesley and Wang, 2017; Hsu et al., 2007). Our findings suggest that university entrepreneurship education programs may play an important role in facilitating social processes, enhancing reputations, providing inspiration, as well as technical training to support entrepreneurship among alumni. However, these programs vary in the type of entrepreneurial activity they support and in their impacts across ethnicity and immigrant status.

Three data-related issues are important to consider when interpreting these results: response rates, representativeness, and self-

Table 7
Determinants of entrepreneurship by ethnicity and nationality.

VARIABLES	(1) Optimism	(2)	(3) Parent is entrepreneur	(4)
Asian	−0.162*** (0.0587)		−0.0270** (0.0119)	
Other Asian		−0.204** (0.101)		−0.0488*** (0.0183)
Chinese		−0.186** (0.0762)		−0.0165 (0.0163)
Indian		0.150 (0.133)		−0.0136 (0.0293)
Black	0.0951 (0.139)	0.101 (0.139)	−0.0483** (0.0225)	−0.0481** (0.0225)
Hispanic	0.233** (0.0978)	0.237** (0.0978)	−0.0444** (0.0186)	−0.0442** (0.0186)
Other	−0.0559 (0.0801)	−0.0497 (0.0801)	−0.00720 (0.0156)	−0.00694 (0.0156)
Asian*Foreign	0.269** (0.106)		−0.0314 (0.0218)	
Other Asian*Foreign		0.0917 (0.158)		−0.0236 (0.0302)
Chinese*Foreign		0.198 (0.142)		−0.0557* (0.0287)
Indian*Foreign		0.459** (0.192)		−0.0325 (0.0420)
Black*Foreign	0.416 (0.321)	0.412 (0.321)	0.0841 (0.0942)	0.0806 (0.0942)
Hispanic*Foreign	0.190 (0.225)	0.183 (0.225)	0.139*** (0.0504)	0.135*** (0.0504)
Other*Foreign	0.168 (0.191)	0.162 (0.191)	0.0749* (0.0455)	0.0715 (0.0455)
Foreign	−0.0332 (0.0677)	−0.0301 (0.0678)	0.0300** (0.0148)	0.0335** (0.0148)
Base controls	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes
Graduation year FE	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes
Observations	13,222	13,222	13,465	13,465
R-squared	0.033	0.034	0.034	0.035

Notes: Base controls include gender, whether one received a graduate degree, parental entrepreneurship, and the three measures of optimism. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

reporting. First, is possible response bias. Graduates who saw themselves or their ventures as unsuccessful may not have responded to the survey or reported on those firms. We addressed this to an extent in the survey itself by asking about all founding attempts and then randomizing which of those we asked for additional data on. Another issue is representativeness and if the responses from this dataset apply to entrepreneurship in general. This paper studies alumni of an important university situated in Silicon Valley at the intersection of technology and entrepreneurship. As would be expected, the rate of entrepreneurship is higher in this sample relative to national statistics which generally put the rate at four to five percent each year (Dennis, 1997). Thus, we do not claim that the sample is generalizable across all types of self-employment. It is representative of an important, interesting population over many decades. We see our results as generalizable to less elite institutions. We believe the key question is whether our results are likely to be an upper bound or a lower bound on the effect size due to the population we have sampled from. The key issues here are differences between elite and less elite universities in exposure to entrepreneurship education and potential selection effects. There are several reasons to believe we may be under-estimating the effect size and thus creating a lower bound on the magnitude of the effect. First, relative to students at less elite institutions, Stanford students have many opportunities for exposure to entrepreneurship both inside and outside of the classroom. This is true both at the undergraduate and graduate levels. Thus, we might expect the non-American Asian

entrepreneurship rate to be even lower at less elite universities. However, we expect this difference to be minimal given the lack of a large effect of participation in Stanford's entrepreneurship programs. Second, we must consider selection effects. Applicants to Stanford (or potentially to other elite universities) may be more (or less) 'entrepreneurial' to begin with. If non-American Asians with entrepreneurial parents are systematically more likely to apply (or to be accepted) to less elite universities, relative to Asian Americans (which we see as unlikely) then we may have an upper bound on the difference in entrepreneurship rate between these groups. On the other hand, if non-American Asians with entrepreneurial parents are systematically more likely to apply (or to be accepted) to more elite universities, relative to Asian Americans, then we may have a lower bound on the difference in the entrepreneurship rate between these groups. These same conclusions would apply if applicants are systematically more (less) likely to accept admission once offered, yet we do not see this as likely and we have no evidence of such systematic differences in conversion rates. Finally, self-reporting and retrospective bias may play a role, particularly for older respondents who may not recall some less successful ventures in their past. Since founding a firm is a significant life event, which one is likely to recall, we do not expect this type of bias to be large.

Current immigration policy is often consumed by debates surrounding low-skilled immigrants. Though the results are based on a selected sample of Stanford University students, it does speak to highly skilled and educated entrepreneurs, who could potentially create high-growth firms. High-skilled immigration policy should be examined and evaluated separately from low-skilled immigration policy and not lumped together into a simplified immigration policy. Young Asian immigrants who grow up in the US are much more entrepreneurial than Asian foreign students, despite similar educational credentials. Allowing immigrants to settle in and attain the cultural and institutional features of the US education system at a young age could positively influence entrepreneurship and innovation, at least among the skilled population.

Finally, the results present a sobering picture for Asian countries that are currently pursuing various policies to promote entrepreneurship and innovation. The low levels of parental entrepreneurship highlight the underlying socio-economic constraints in entrepreneurship. The high intergenerational persistence in entrepreneurship further hinders the younger Asian citizens to break out from a low equilibrium. In some respects, the entrepreneurial push pursued by Asian governments is very likely what they need to do to break out from a spiral of low entrepreneurship and high intergenerational persistence in entrepreneurship. However, the significant difference in entrepreneurial activities we find between Asian Americans and non-American Asians may provide another way to promote entrepreneurship in Asia. Asian Americans often inherit the language and cultural backgrounds from their parents and are better able to integrate within their native land, enabling them to navigate through the bureaucracies and culture of Asia while supplying innovative business ideas. Policies that promote such transnational bridging may indeed serve as an effective yet low cost way to promote entrepreneurship (Shin and Choi, 2015). An interesting avenue for future research would be comparing the performance of returnee entrepreneurs. For instance, comparing the entrepreneurship rate and performance of those who permanently remain in the US, those who build their careers in the US for several years and then return to their home country to start a business, and those who return to their home countries soon after graduation. It would be interesting to see whether entrepreneurs with familiarity and experience with the business environments of both the US and home country perform better than those who predominantly only experience one culture (the US or home).

Our findings also provide important nuance to the idea that universities may promote entrepreneurship via admitting more international students or by simply exposing them to traditional entrepreneurship classes. Admissions policies may be examined in future research that specifically select

Table 8
Intergenerational correlation of entrepreneurship by ethnicity and nationality.

VARIABLES	(1) Entrepreneur		(2) Entrepreneur	(3) Entrepreneur
Parent entrepreneurship	0.224*** (0.0111)	Parent entrepreneurship	0.227*** (0.0268)	0.227*** (0.0268)
Parent entrepreneurship* Asian	−0.00186 (0.0287)	Parent entrepreneurship* Korean	0.280** (0.140)	0.272 (0.216)
Parent entrepreneurship* Black	0.0607 (0.0687)	Parent entrepreneurship* Japanese	0.143 (0.152)	0.202 (0.176)
Parent entrepreneurship* Hispanic	−0.0164 (0.0510)	Parent entrepreneurship* Chinese	0.519*** (0.105)	0.292*** (0.110)
Parent entrepreneurship* Others	0.0174 (0.0374)	Parent entrepreneurship* Indian	0.0609 (0.0939)	0.0616 (0.152)
		Parent entrepreneurship* Taiwanese	0.234* (0.132)	0.259 (0.193)
		Parent entrepreneurship* US	−0.00820 (0.0288)	0.00811 (0.0297)
		Parent entrepreneurship* Korean*Post 1997		0.0162 (0.284)
		Parent entrepreneurship* Japanese*Post 1997		−0.193 (0.336)
		Parent entrepreneurship* Chinese*Post 1997		0.399*** (0.122)
		Parent entrepreneurship* Indian*Post 1997		0.0253 (0.185)
		Parent entrepreneurship* Taiwanese*Post 1997		−0.0296 (0.254)
		Parent entrepreneurship* US*Post 1997		−0.0516** (0.0215)
Ethnicity dummies	Yes	Ethnicity dummies	No	No
Country dummies*Post 1997	No	Country dummies*Post 1997	Yes	Yes
Country dummies	No	Country dummies	Yes	Yes
Base controls	Yes	Base controls	Yes	Yes
Age fixed effects	Yes	Age fixed effects	Yes	Yes
Stanford graduation year FE	Yes	Stanford graduation year FE	Yes	Yes
Observations	16,202	Observations	16,359	16,359
R-squared	0.121	R-squared	0.123	0.124

Notes: Base controls include gender, whether one received a graduate degree, parental entrepreneurship, and the three measures of optimism. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

applicants with entrepreneurial backgrounds. In terms of curriculum, it may be that classes tailored to provide entrepreneurial mentors and role models might be especially important (Eesley and Wang, 2017). In addition, coursework that specifically teaches skills and frameworks relevant to immigrant entrepreneurs might be added to the curricula. For instance, Stanford has recently added courses titled, “Creating High Potential Ventures in Developing Economies” (in the Graduate School of Business) and “Entrepreneurship Without Borders” (in the School of Engineering) to teach skills specific to immigrant and returnee entrepreneurs. Finally, we note that future work might examine variation across universities in that some may be relatively more welcoming to immigrant entrepreneurs or help them get established in entrepreneurship communities better than others via their alumni networks. For instance, New York University (NYU) and Duke University have also partnered with universities in China to allow both Chinese nationals and students from their U.S. campuses to mix and study either in China or in the United States.

Prior work on immigrant entrepreneurs and innovators has emphasized the knowledge spillovers provided by migrants (Filatotchev et al., 2011; Gibson and McKenzie, 2014; Marx et al., 2015) and return migrants (Qin, 2015). It has also suggested that high-skill immigrants and university graduates are particularly likely to start new firms (Hsu et al., 2007; Hart and Acs, 2011; Kenney and Patton, 2015) and improve the productivity of local industry (Canello, 2016). Yet, such work has not systematically examined immigrant entrepreneurs from a single university in comparison with both domestic alumni and first-generation children of immigrants

sharing the same ethnicity. Our findings highlight the value of immigration in terms of breaking the persistence in entrepreneurship among Asians and promoting potential high-growth entrepreneurship in the United States. Lastly, we contribute to the empirical and theoretical discussions on entrepreneurship and innovation by examining the intersection of immigration, culture, and education. The theory of immigrant entrepreneurs generally centers around the voluntary migration of high-skilled individuals who bring knowledge, skills, and networks to the host country. However, what we highlight in this paper is the potential contribution of second-generation immigrants, who become culturally assimilated and educated in their host countries. There has been relatively little discussion and examination on how this population can contribute to entrepreneurship and innovation. Our paper presents an examination to this nascent topic.

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Appendix A

See Tables A1 and A2.

Table A1
Logit regressions on responder status.

	Pr(respond)	Pr(respond)	Pr(respond)	Pr(respond)
Female	1.051** (0.018)			1.143 (0.514)
Earth Sciences			1.074 (0.053)	0.535 (0.550)
Education			1.183*** (0.039)	0.662 (0.905)
Engineering			0.883*** (0.020)	0.280 (0.236)
Law			0.741*** (0.027)	0.565 (0.185)
Medicine			1.698*** (0.048)	0.170 (0.162)
Humanities & Sciences			0.508*** (0.011)	
Graduation Year		0.991*** (0.000)		
Gender*Graduation year FE				Yes
Gender*school FE				Yes
Graduation Year FE				Yes
Observations	133,916	139,004	143,632	70,926

Notes: Robust standard errors are reported in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A2
Entrepreneurship in the US based on ethnicity and nationality.

VARIABLES	(1) Entrepreneur	(2) Entrepreneurship in the US	(3)	(4)	(5) Report country
Asian		-0.00665 (0.0131)			
Other Asian	-0.0131 (0.0202)		-0.0447** (0.0196)	-0.0444** (0.0196)	-0.0362 (0.0537)
Chinese	0.0420** (0.0177)		0.00394 (0.0177)	0.00448 (0.0177)	-0.0635 (0.0388)
Indian	0.108*** (0.0343)		0.0420 (0.0329)	0.0427 (0.0329)	-0.0490 (0.0684)
Black	0.0781*** (0.0286)	0.0508* (0.0282)	0.0510* (0.0282)	0.0512* (0.0282)	-0.0249 (0.0494)
Hispanic	-0.0296 (0.0204)	-0.0580*** (0.0200)	-0.0579*** (0.0200)	-0.0577*** (0.0200)	-0.0847 (0.0548)
Other	0.0532*** (0.0164)	0.0203 (0.0163)	0.0207 (0.0163)	0.0210 (0.0163)	-0.00639 (0.0345)
Asian*Foreign		0.0145 (0.0233)			
Other Asian*Foreign			0.0130 (0.0320)		0.0494 (0.0745)
Other Asian *Foreign*Korea	-0.0492 (0.0504)			0.0500 (0.0465)	
Other Asian *Foreign*Japan	-0.238*** (0.0416)			-0.0445 (0.0372)	
Other Asian *Foreign*Rest	-0.0831* (0.0487)			0.0670 (0.0488)	
Chinese*Foreign	-0.0919*** (0.0329)		-0.00266 (0.0305)	-0.00282 (0.0305)	0.00867 (0.0637)
Indian*Foreign	-0.139*** (0.0487)		0.0170 (0.0456)	0.0170 (0.0456)	0.000927 (0.0893)
Black*Foreign	0.00388 (0.0860)	0.145 (0.150)	0.0867 (0.103)	0.0873 (0.103)	0.161 (0.101)
Hispanic*Foreign	0.0901* (0.0510)	-0.0877 (0.0665)	0.0663 (0.0567)	0.0662 (0.0567)	0.0981 (0.0799)
Other*Foreign	0.0662 (0.0447)	-0.0692 (0.0657)	0.0522 (0.0516)	0.0520 (0.0516)	0.0127 (0.0657)
Foreign	0.0897*** (0.0167)	-0.610*** (0.0264)	-0.101*** (0.0158)	-0.101*** (0.0158)	0.0216 (0.0244)
Base controls	Yes	Yes	Yes	Yes	Yes
Age fixed effects	Yes	Yes	Yes	Yes	Yes
Graduation year FE	Yes	Yes	Yes	Yes	Yes
Department FE	Yes	Yes	Yes	Yes	Yes
Observations	13,222	12,653	12,653	12,653	4281
R-squared	0.185	0.136	0.136	0.137	0.242

Notes: Base controls include gender, whether one received a graduate degree, parental entrepreneurship, and the three measures of optimism. Ethnicity and nationality as reported by the respondent. Others include respondents who select other categories or multiple ethnicities. Robust standard errors are reported in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

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